

## Spiders: resource information

The study of spiders is called arachnology

### What are spiders?

Animals belonging to the class known as **Arachnida**. They have 2 parts to the main body:

- hard front part, the head and thorax, called the **cephalothorax** or prosoma;
- soft hind part, the abdomen, called the **opisthosoma**.

They have a narrow stalk or waist called the pedicel joining the cephalothorax and opisthosoma. They always have **8 legs and 2 palps** (used for grooming and feeding) attached to the cephalothorax. They have no wings or antennae, although the palps at the front act like antennae. Spiders are the largest group of predators in the world.

### Closest relatives

Mites, scorpions, pseudoscorpions, harvestmen.

### How many different species are there?

Worldwide there are 37,500 different species known. By comparison, there are only 9,000 species of birds and 4,000 species of mammals. New Zealand has at least 2,500 species, but only 1,300 have a scientific name.

### Spider skeleton

The skeleton is an external exoskeleton, which provides:

- support for the animal contents and muscles;
- protection against water loss.

The exoskeleton of spiders doesn't grow with them, so they have to moult (shed their skin) to grow. They only do this when they are young, and cease to moult once they become an adult.

### Regeneration of legs

Young spiders are able to regrow (=regenerate) a leg if it is lost. With each moult the regenerated limb will increase in size. Adult spiders cannot regenerate legs.

### Silk

Silk is manufactured inside their body. There are 2-7 silk glands depending upon the type of spider. Liquid silk is hardened by using their back legs to apply tension to it as it comes out of their body. Each silk gland produces a different type of silk, for example:

- sticky silk for trapping prey;
- dragline silk to protect them if they fall by acting as a safety line like a "bungee cord";
- egg sac silk to protect eggs.

### Where are spiders found?

Spiders occur on all continents except Antarctica. There are more species in the tropics than in the temperate areas of the world. Most spiders are terrestrial, living on or near the ground.

### Main types of spiders

There are 2 main groups:

**1. Mygalomorphs** = primitive spiders, 4 book lungs (breathing apparatus); examples are tarantulas, tunnelweb spiders.

**2. Araneomorphs** = true spiders, 2 book lungs (breathing apparatus); examples are orbweb spiders, hunting spiders.

### Main lifestyles for spiders

There are 3 main types of lifestyle:

**1. those that live in webs:**

- are aerial dwellers and often visible;
- use sticky silk to capture prey;
- their most common web type is cartwheel-shaped, although sheetwebs also common.

**2. those living in tunnels:**

- are concealed on the ground or in trees;
- wait for food to drop by;
- use trigger threads.

**3. those that are hunters:**

- are usually nocturnal, hiding by day;
- sometimes hunt and stalk prey at night;
- some daytime species sit and wait then pounce, for example, crab spiders.

### Spider senses

#### Sight

Spiders have simple eyes (one facet only), 2 are main eyes on front of the cephalothorax. Spiders usually have a total of **8 simple eyes**, sometimes 6, and rarely 2. Spiders with the best sight are jumping spiders.

#### Touch and taste

Spiders use hairs on their body as touch and taste receptors. There are receptors for vibrations, air currents, humidity, and food.

### How do they walk upside down on ceilings and in their webs?

Hunting spiders have a special brush of hairs on their legs allowing them to adhere to surfaces so they can walk upside down. Web spiders have a special oil on the tips of their legs that stops them sticking to their webs.

### Enemies

Spiders are constantly in danger of being eaten. Enemies include birds, wasps, small animals, and humans. In some species males sometimes get eaten while mating.

Spiders with:

**dull colours:** hide away, use their colour as camouflage on dull backgrounds.

**bright colours:** indicate to enemies to stay away as they are poisonous or dangerous, use their colour as camouflage on bright backgrounds.

### Spider food

Spiders are predatory, carnivorous arthropods, mainly feeding on other invertebrates. Food is **live prey only**. Digestion starts outside the mouth:

- they secrete digestive juices over the prey and turn it into a liquid;
- they suck the liquified prey inside using their strong sucking stomach.

Spiders often increase their body weight by 50% with a good meal. Spiders can eat their own weight in one meal (what weight of food would that be if it were you?) Spiders can go for long periods without food, the longest record being for 1 year (however, they do need moist conditions to prevent dehydration).

### Venom

All spiders have venom, which they use to overcome prey. The jaws of most spiders are unable to pierce human skin or, if they can, the venom in the majority of species is not strong enough to have a bad effect. Spiders in the *Latrodectus* group (widows / redback) have a potent venom affecting us. The most potent spider venom in the world to humans is the Sydney funnelweb spider, which does not occur in New Zealand.

### Fossil history

Spiders have been around for about 350 million years. The earliest fossils date back to the Devonian period. Most fossils are from 200 million years ago, the Upper Carboniferous period.

### Largest, smallest?

World's **largest** spider = goliath or bird-eating tarantula, found in South America (body 90 mm long, leg span 250 mm).

World's **smallest** spider = an orbweb from Samoa (body 0.43 mm long, about the size of a pinhead).

### Movement

The speed of spiders is dependent upon temperature: they are slower when it is cooler. Some spiders can move very fast: these are usually hunters. However, they still only have short bursts of fast movement. Some spiders are slow: these are usually web inhabitants.

### Ballooning

This is one way spiders are spread around without wings. Young spiderlings spin out pieces of silk like a

parachute and wait until the wind takes them away like a balloon. Spiderlings can travel many kilometres this way, including over oceans.

### Mating

Mating can take hours. Males transfer sperm from their abdomen to their palps. Then the palps are inserted into the female abdomen. Up to 300 eggs are laid by a female in a single egg sac, protected by layers of silk. Some spiders provide maternal care, usually only to the egg sac or young. Male crab spiders tie the female down with silk.

The Avondale spider is an exception amongst spiders, with large groups of immatures, females, and males being found coexisting with each other.

### The spiders you usually see

Most spider species in your own back garden have come to New Zealand from overseas. Examples from Australia include the large garden orbweb spider, *Eriophora pustulosa*, and the white-tailed spider, *Lampona* sp. The slater spider, *Dysdera crocata*, is from Europe. Some of these have come to New Zealand by human carriers and trade, and some have also come by ballooning.

Only a few native spiders have adapted to human-modified environments, for example, the crab spiders on garden flowers.

### The spiders you don't usually see

You usually have to go into the bush to find our native species. We have many species of spiders that occur nowhere else in the world, or are only represented by a few other species in the Southern Hemisphere. This is why New Zealand is so interesting to arachnologists.

### Good spider books

"Fascinating Spiders", Olwyn Green & Mavis Lessiter: Bush Press. 1987.

"Amazing Spiders", Alexandra Parsons: RD Press. 1990.

"New Zealand Spiders and their Worldwide Kin", R.R. & L.M. Forster: University of Otago Press. 1999. *New Zealand Geographic* No. 10, April-June 1991, pages 68-96, includes poster.

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